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INHALATION OF ETHER.

BY J. MASON WARREN, M.D.

ONE OF THE SURGEONS OF THE MASSACHUSETTS GENERAL HOSPITAL.

[From the Boston Medical and Surgical Journal.]

THE practical importance of this valuable discovery for the relief of human suffering is now very generally admitted, and its use for this purpose becoming more extensive both at home and abroad. It therefore is a subject of much interest to determine, by the observation of its effects in a number of persons of different ages, sexes and temperaments, to what class of patients it is applicable, when its use should be desisted from, and, also, what length of time the inhalation may be continued. This latter point requires especially to be settled, as it was a question at first, whether in surgical operations requiring for their performance a longer space of time than six or seven minutes, the suffering could be annihilated. Another question of interest also presented itself to the mind of the surgeon; which was, whether, in operations of much delicacy, the violent muscular movements, which were occasionally observed, or the sudden starts consequent on a return to consciousness, would not interfere with the safe prosecution of the dissection.

These considerations have led me to draw up an account of the history of a number of cases in surgical practice under my observation, since the first introduction of this remedy, which will assist in solving some of the above-mentioned propositions. For the sake of convenience I shall attempt some arrangement of these cases, according to the age and constitutional effects. Some of them I shall give more in detail than is absolutely necessary to illustrate the effects of the ether, on account of their interest in a surgical point of view. The first cases will be those of children.

CASE I.—This was a fine, handsome boy, 12 years of age, in vigorous health. He was brought to me by his parents, on account of a scar on the upper lip, about an inch in length, which had been caused by a contusion. The red part of the lip had united irregularly, and produced considerable deformity. The operation necessary for the relief of this accident was likely to be painful, protracted, and to require much delicacy. It was important, therefore, that the patient should be kept in the most perfect state of quietude. This was not likely to be the case, as he stoutly resisted the idea of submitting to any suffering. His parents were therefore very desirous for him to take the ether.

No surgical operations had thus far been recorded of the application of the inhalation to subjects of this age, and I had therefore some hesitation in advising its use; especially, as I had learned from Dr. Morton that the first time he administered it to a child it was followed by vomiting and long-continued faintness. On a subsequent interview with Dr. M., and also with Dr. Keep, I learned that both these gentlemen had afterwards used it on children as young as eleven years, with the most gratifying results, and in no case with any bad consequences. I therefore determined to employ it in the present instance, and the patient readily gave his consent to the operation, when he was informed that he was to be spared all suffering.

The ether was administered by Dr. Morton, and after a few minutes passed in making the patient comprehend the proper method of inhaling, he gradually began to breathe it regularly, and in a few minutes was under its influence. At the commencement of the process the eyes were highly injected with blood, the face flushed, and the pulse accelerated, but as the influence of the ether increased, the pulse gradually declined, and the color left the cheeks.

During the operation, which consisted in dissecting out the cicatrix from the lip, he remained immovable, not the slightest shrinking or muscular action of any kind being perceptible. He recovered from this insensible state while the edges of the wound were being adjusted and the sutures inserted, but did not make any complaint. The pulse was now found to be slow (say sixty in the minute), the pupils dilated. He vomited a little and was faint for half an hour, but when I saw him in the afternoon he had quite recovered from the effects of the application.

CASE II.—I assisted Dr. Brown in an operation for club-foot, on a little timid, delicate boy, 11 years of age. All our entreaties failed to

induce him to inhale the ether from the ordinary apparatus. I finally wet a couple of sponges with ether, and placed them near his mouth. Gradually he became animated, and seemed to be much gratified with the taste. The face became flushed ; he said he felt dizzy ; his eyelids closed, and he became almost insensible.

At this period it was thought necessary to remove him to another part of the room on account of the light. The movement roused him so much, that he went through the operation with the appearance of a person in a bad dream. He afterwards said, that he thought himself seized by robbers, carried into a wood, and had his heels pricked.

This case is mentioned to show, that a *sponge* may be substituted for the inhaling apparatus, when the ether is applied to a child who is too young to comprehend the ordinary process. Dr. J. C. Warren informs me that, for a little irritable boy at the hospital, affected with a very painful disease of the hip-joint, who every night required the use of an opiate, he directed a sponge dipped in ether to be laid on his pillow. The effect of this application was to produce sleep in three minutes. The patient awoke from its influence in half an hour, then composed himself again, and remained quiet until morning.

In the three following cases the patients were entirely free from suffering, although quite conscious of what was going on during nearly the whole of their respective operations.

CASE III.—Mr. L., a gentleman remarkable for his powerful muscular development, who required the removal of an encysted tumor from the arm, inhaled the ether about three minutes, and appeared to be quite under its influence. He soon began to recover his speech, and during the operation described the details of a previous one he had undergone. He was perfectly conscious of what was going on, but bore the cutting without shrinking, and, as he subsequently said, without feeling anything which could be called pain. A slight degree of exhilaration was experienced for about ten minutes afterwards.

CASE IV.—Mr. Hathaway, 25 years of age, had the flesh jammed off from the middle finger of the right hand five months since. The wound healed slowly, and left the bone covered by a thin and tense cicatrix. The effect of this was to produce such an extreme degree of sensibility of the part, as to render the hand almost useless ; in addition to which he was subject to attacks of severe neuralgia. I advised him to

have an incision made through the cicatrix (which probably compressed the digital nerves against the bone), the skin dissected off, and the end of the bone removed.

The ethereal inhalation was administered by Dr. Morton, and in five minutes he became insensible. Very soon after the operation had commenced, he recovered his consciousness sufficiently to inquire how we were getting on, requesting that we should not hurry, but that the operation should be done thoroughly. This being completed, and the wound dressed, he said that he had been well aware during the greater portion of the time of what we were doing, but felt no more pain than he would have experienced from an ordinary examination of the part. The pupils during the action of the ether on the system were dilated, and the pulse slower than natural. He had no subsequent ill effects from it, and returned home in about two weeks, quite free from his neuralgic troubles.

CASE V.—**REV. MR. S.**, from Nova Scotia, consulted me in February for a tumor of the neck, about the size of an egg, a little under and to the inside of the sterno-mastoid muscle, on a line with the larynx. It gave a semi-elastic sensation to the touch, and at first seemed to have a strong pulsation; but on a more critical examination this was evidently shown to be communicated to it from the carotid artery, which was directly beneath.

This tumor appeared about nine months since, in the course of a severe influenza; it very rapidly attained its present size, and in spite of all remedies has not shown any disposition to diminish. By a surgeon who had previously examined the patient, it was supposed to be of the aneurismal character. I determined to make a careful incision down to the tumor, ascertain its nature, and if it proved to be encysted, as I supposed, to open it, evacuate its contents, and dissect out the sac.

The operation was done in the presence of Drs. Parkman, Sargent, Briggs and J. C. Warren. Mr. S. having respired the ether for five minutes, appeared insensible. An incision, about three inches in length, was made along the inner edge of the sterno-mastoid muscle. The dissection was prosecuted through the platysma and the layers of the superficial fascia, until the tumor was fairly exposed: it proved to be encysted. The fluid contents were next evacuated. Then passing my finger into the sac, I could feel the carotid artery in bold relief running along its whole posterior portion. The sac was carefully dissected from the sheath of the vessels, and the operation terminated with but little hæmorrhage.

In the course of the operation the patient spoke, and remarked that he knew everything that was going on, but felt no pain. He asked, if it would not be well to give him more ether; this request, he afterwards said, was from fear that he might have pain as he returned to his natural feelings.

He experienced no ill effects from the inhalation, and had recovered from the wound in about fourteen days.

CASE VI.—On the 4th of March I operated on a patient for varicocele of some years standing. The veins of the left side were enormously dilated into two large bunches, which dragged down the testicle, and caused much discomfort to the patient. The day before the operation, I accidentally saw a gentleman for whom I had performed excision of a portion of the scrotum four years ago, according to the plan suggested by Sir Astley Cooper, with the effect of producing a complete cure. In the present instance I determined to have recourse to a less bloody proceeding, and which I had practised a number of times with success. It was executed in the following manner.

The patient having been first placed in an upright posture, in order to distend the vessels, an incision was made in the scrotum about an inch in length; the veins were then allowed to protrude *en masse*, the protrusion being aided by a little dissection, and a needle armed with a double ligature passed through the base. The loop of the ligature was then cut, and the threads tied tightly on either side, so as completely to strangle the base of the tumor.

The patient respired the ether for five minutes previous to the operation, but unfortunately the stock of this article being exhausted, the dose was not sufficient to produce the ordinary effects, and at the end of that time he said, "I feel as strong as ever." During the whole of the after proceedings, however, which generally are attended with much suffering, he manifested not the slightest symptom of pain. The ether had evidently blunted the feeling, without any apparent effect on the consciousness.

In the three following cases the inhalation seemed to produce either a partial, or entire state of asphyxia.

CASE VII.—Mary Muldran, aged 58, a widow, from Ireland, presented herself to me in the latter part of November, 1846, with a malignant disease of the upper jaw. I referred her to the Massachusetts

General Hospital, where she entered on December 2d, and gave the following history of herself.

Eight weeks since she perceived a hardness and slight pain around the alveolus of the left upper canine tooth, which had been removed some time before. A few days afterwards a small pustule appeared at this point, which she pricked with a pin. A fungous tumor very shortly made its appearance, which has increased rapidly since, and within the last week has nearly doubled in size.

There is now a fungous tumor of the size of a walnut attached to the alveolus ; it is of a mottled chocolate color. The portion opposed to the lower jaw is slightly ulcerated, and from this spot there has once or twice been a slight hæmorrhage. The tumor has also been lately the seat of lancinating pains.

The operation was performed by Dr. J. C. Warren, the patient being first brought under the influence of sulphuric ether administered by Dr. Morton. An incision was made through the cheek, and the soft parts dissected, so as to uncover the left upper maxillary bone. The cutting forceps were then applied on each side of the tumor ; the two lateral incisions, united by a transverse, or horizontal incision, removed the whole of the disease. The antrum was laid open. The hæmorrhage was great, but finally restrained by the actual cautery. This account is condensed from the books of the Hospital.

The effects of the inhalation in this case were peculiar. Supporting the head of the patient during the operation, and after she was under the influence of the ether, I found her countenance to be livid, the hands to be slightly clenched, and the blood partially settled about the fingers. The respiratory process was but imperfectly performed, and the blood which ran down the throat seemed to pass unobstructed into the lungs, or with but slight resistance from the epiglottis. As soon as was permitted by the termination of the operation, which was very rapidly performed, I threw the head forwards, so as to prevent the blood from passing down the throat. The natural respiration very shortly afterwards returned, and the patient recovered her consciousness without further difficulty. She said that she had been entirely free from pain, and had not been aware of the steps of the operation.

This woman came to me a few days since, quite recovered, and free from any traces of disease. She had been discharged well from the Hospital on December 24th.

CASE VIII.—This is also condensed from the Hospital books. Catharine Crowley, aged 50 years, entered the Hospital on August 3d, 1846, with necrosis of the tibia, attended with an extensive ulceration of the soft parts, the discharge from which was exceedingly offensive. She remained in the Hospital under treatment five months. The disease, however, finally became so painful, and the destruction of the tissues so extensive, that she requested to have the limb removed. This being agreed to at a consultation of the Surgeons of the Hospital, amputation was performed by Dr. Hayward on January 9th, 1847.

After inhaling ether for a few minutes, which she seemed to do with great difficulty, raising her head up from the table, and making other movements indicative of distress, a general spasm of the system occurred. The hands were clenched, the lips strongly compressed together and livid, the face deadly pale. Having my thumb on the femoral artery, preparatory to making compression during the operation, I found that the pulse disappeared. At the same time the respiration momentarily ceased. The pillow which supported her head being removed, it fell backwards, allowing the mouth to open. Frictions being made on the surface of the chest, the respiration returned, and these unpleasant symptoms passed off. She was not conscious of any pain until the bone was sawed.

In the afternoon she was in some degree excited, and required an opiate draught. The stump has since healed well, and she is now almost ready to leave the Hospital.

A slight degree of asphyxia was manifested in the following case.

CASE IX.—Mrs. T., aged 40 years, consulted me for a small subcutaneous tubercle on the right breast, which had troubled her for a year. It was very hard, had a slight redness about its edges, and was at times exquisitely painful. I advised its immediate removal. She had a great dread of the knife, and was desirous of taking ether. A time was appointed for the operation, but on the day previous she had a tooth removed while under its influence. This application had apparently, as will be perceived in the sequel, increased the susceptibility to its own influence—a circumstance, I believe, not unusual.

Her pulse previous to the operation was quite feeble, the system having been somewhat deranged, both by the troublesome tooth and mental affection for some days previous. She respired ether for about a couple of minutes, and then became entirely insensible: the inhaling apparatus was continued at the mouth during the operation, which lasted about two minutes longer.

After the tumor was removed, my attention was directed to the patient, and I observed that she was very pale, not disposed to any voluntary movement, that the pulse was small, and the respiration scarcely perceptible. The air of the chamber being confined, a window was opened so as to admit a fresh current, stimulants were given internally, and frictions made over the surface of the body. She gradually recovered her consciousness, but it was found necessary to keep her in motion, by causing her to walk up and down the room between two persons, to prevent her from relapsing again into an unconscious state. In the course of half or three quarters of an hour she was allowed to go to bed, and had no further difficulty. I saw her in the afternoon, and she was, with the exception of a little dizziness, free from any unpleasant symptoms.

The odor of ether in this, as in a number of other cases, was apparent for some days afterwards, being evolved not only from the lungs, but also from the whole cutaneous surface of the body.*

In all three of these instances, the blood, by some persons present, was thought to be of a much darker color than natural.

The two following cases will give some idea of the length of time, during which the inhalation may be continued.

CASE X.—A young gentleman from Halifax, aged 16 years, came under my care in January, for a tumor situated in the substance of the right cheek. One of a similar nature had been removed from the same situation two years before, but had speedily re-appeared. When I saw this patient, the whole right side of his face looked larger than the other, the veins were everywhere distended, and at first sight a malignant disease of the antrum would have been suspected.

On careful examination, I discovered a lobulated tumor deeply seated in the substance of the cheek, just below the zygomatic arch, and apparently running up under that bone. It was quite hard and moderately movable. A large vascular polypus also occupied the right nostril, and entirely obstructed the breathing through that side.

In consultation with Dr. J. C. Warren, it was determined to remove the tumor, which was done on January 28th, in the presence of a number

* Dr. Charles F. Hayward, House Surgeon to the Hospital, informs me that the following effect was produced on the urine of a gentleman who inhaled it at that institution. "He passed an extraordinary amount of urine after inhaling ether, and on examination, his water was found to be very limpid, almost colorless, with a specific gravity of 1.004, and having the odor of ether very well marked." This experiment was twice repeated with the same result.

of medical gentlemen. Ether was exhibited by Dr. Morton, and in four minutes the patient was quite insensible. A transverse incision was then made along the lower edge of the zygoma, the skin and muscular substance cut through, which exposed an erectile vascular tissue, entirely enveloping the tumor, and intimately connected with the surrounding parts. In dividing this, in order to arrive at the body of the tumor, a hæmorrhage commenced, which greatly obscured the dissection, and it was only by compressing the carotid artery, that the operation could be continued.

The tumor was now discovered extending up under the zygomatic arch, but only attached in that direction by a loose cellular tissue; behind, it dipped down in the direction of the spheno-maxillary fissure. It was finally detached from these different connections, after a long dissection. The operation was suspended from time to time, in order to allow the repetition of the ether, which was thus three times repeated at the request of the patient, and after the first time with an almost instantaneous effect. He said subsequently, that he had experienced no pain, and that his impressions were of an agreeable character. His call for the ether, he said, was partly for the pleasure of taking it, and not entirely on account of the relief it afforded him from suffering.

In consequence of the great hæmorrhage from every part of the wound, it was finally found necessary to stop the bleeding by compression with sponges. No subsequent bleeding took place, and the patient recovered without any bad symptoms. One or two weeks elapsed, however, before the sponges could be extricated from the wound, so firmly were they embraced by the granulations, and at length removal was only accomplished by tearing them away piece-meal. The disease was of the encephaloid character, and entirely surrounded by erectile tissue, the division of which gave rise to the hæmorrhage. With the exception of the actual cautery, the use of the sponges seemed to me the only means of stopping the flow of blood, and from the great difficulty here encountered in the removal of these from the wound, I think that in a similar case I should give the preference to the former.

CASE XI.—A large, powerful, full-blooded man, 34 years of age, consulted me for a tumor in the right parotid gland. A tumor had been removed from the same spot twenty years ago, which shortly afterwards reappeared in the form of a small, hard tubercle under the ear. For fifteen years it remained stationary, and then began to increase. It is now

about the size of a hen's egg, of a bluish color, lobulated, and having a hard base surrounded by small cysts. The lobe of the ear is pushed upward by the tumor, which extends inward and apparently involves the lower half of the parotid gland.

As the patient was very desirous of an operation, I determined on its removal. It was a question, whether it would not be advisable to apply first a ligature to the carotid. On examination by a number of medical gentlemen, it was thought possible to remove it without having recourse to this means. Drs. J. C. Warren, George Parkman, S. Parkman, Briggs and Mr. Slade, were present at the operation.

Ether was given him by Dr. Morton, who was desirous of seeing its effects on so powerful a patient. The pulse, before its exhibition, was 90. On commencing the inhalation, the eyes and face were much injected with blood, but as it was continued he gradually became pale, and in about the ordinary time was quite insensible. The tumor required a very slow and careful dissection; the base of it was found to have undergone osseous degeneration, and pressed upon the facial nerve as it crossed the styloid process. This was the cause of a paralysis, which was gradually taking place, a fact I omitted to state in the history of the case.

Towards the middle of the operation, the patient began to make strong muscular exertions, indicative of returning consciousness, and which somewhat interfered with the dissection. As soon as he complained of pain, a second dose of ether was administered, which took effect speedily, and prevented him from suffering for the remainder of the time. The operation occupied about half an hour; and although it was severe, not the slightest constitutional trouble followed. In the course of a week he was able to return home to Maine.

CASE XII.—On March 9th, I assisted Dr. J. C. Warren in an operation on a lady, 64 years of age, for the removal of a cancer of the breast. At the beginning of the inhaling process she made the ordinary complaint of being choked by the ether, but soon, however, began to breathe it easily, and in four minutes was unable to inhale longer. During the first part of the operation, which involved a very painful dissection of the skin, she made no complaint, and soon began to sing. Having continued to do so for some moments, she became uneasy and seemed to suffer, but was unable to state the cause.

This is the oldest person whom I have seen under the influence of ether, and it seemed to have as favorable an effect in her case as in younger persons, and was followed by no apparent ill consequences.

In the two following cases of amputation at the Hospital by Dr. Townsend, the patients were unconscious during the whole of the operation.

CASE XIII.—Fanny Abbot, 42 years of age, entered the Hospital on December 23d, for the purpose of undergoing amputation of her leg, on account of a carious affection of the bones of the ankle, of eight years duration. Being rendered insensible by ether, which was administered in this, as in most of the other operations at the Hospital, by Dr. H. J. Bigelow, the leg was removed at its middle by the circular operation. The artery was compressed in the groin, and very little blood lost. She was entirely passive, and asserted that she knew nothing, until after the dressing of the wound.

CASE XIV.—James Mitchell, an Irish brakeman, 27 years of age, entered the Hospital on February 2d, for a compound comminuted fracture of the leg, which it was found necessary, on a consultation of the surgeons, to amputate immediately. The operation was done by Dr. Townsend.

The limb was removed six inches below the knee by the circular method, and the operation was rendered difficult by the great infiltration of the limb with blood. The amputation was, however, speedily performed, and without the slightest knowledge of it on the part of the patient.

On the operation being terminated and the return of sensibility, he was asked if the amputation should begin, to which he assented. At first he was quite exhilarated, then shed tears, but afterwards recovered his high spirits, which he retained for some time.

Each of the following cases presents some interesting points.

CASE XV.—On the same day that I operated on the malignant erectile tumor, No. 10, another person consulted me with a tumor in the substance of the right cheek, having some striking points of resemblance to the former case. He said that it made its appearance ten years since, from which time it had gradually increased.

When I saw him, the cheek on that side was much forced outward, and he informed me that at times it was one third larger than the other. With one finger applied on the inside of the mouth and the thumb externally, so as to embrace the whole substance placed between them, I distinguished a hard lobulated tumor, quite movable, situated below the

zygomatic arch, and partially extending up under it. By the use of force it could be carried outward, so as to make a projection over the ramus of the lower jaw. During the examination I perceived something of a less resisting nature than the body of the tumor slip from under my fingers. After one or two trials, and taking into consideration the history of the case, the large projection on the cheek not accounted for by the tumor to be felt there, also its periods of increase and decrease, I came to the conclusion, that I had to do with a tumor pervaded by the erectile tissue.

As the patient lived out of town, I advised him to enter the Hospital, where I operated upon him in February. Before the operation, a number of gentlemen who examined this tumor, could not be convinced that it was other than an ordinary steatoma. The patient was put into a state of insensibility by inhaling ether for four minutes. The tumor was now made to project over the lower jaw, by forcing it from the inside of the mouth. The first incision laid bare the muscle; this being divided, a mass of varicose vessels, principally venous, projected through the wound; these, together with the body of the tumor, were dissected out, with some hæmorrhage. The operation was terminated by embracing with a ligature the base of this congeries of vessels.

During the whole of this time the patient was insensible. When he revived he said that he had been on a long journey, and was surprised to find the operation terminated, and anxious to know if it had been thoroughly done. A severe attack of inflammation followed, which terminated by a large abscess in the cheek. This I did not regret, as it would probably be the means of destroying any of the erectile tissue which might remain. He left the Hospital well in a fortnight.

The nucleus of the tumor in this case seemed to be composed of a fatty substance, quite firm before removal, but easily broken up by the fingers after it was dissected out. The mass of it was composed of erectile tissue.

CASE XVI.—This case is taken from the Hospital books. A young man, aged 21, entered the Hospital August 1st, 1846, for a fracture of the bones of the face, and extensive laceration of the lips and cheek. He was discharged August 17th, much relieved. On December 18th, he returned to have an operation upon the under lip, which has an ugly eschar, and exposes his teeth. The fractured bones are consolidated, and the wounds entirely healed. A small piece of bone came through the cheek about three weeks ago.

The lip being rendered tense, a V shaped incision was made by a narrow straight knife. The lip was first transfixed, and the prolabium cut through. The part to be removed was then seized with a hooked forceps, and the other incision made from above downwards. The edges were confined by three points of suture and adhesive straps. On December 24th, he was discharged well.

This young man inhaled ether for a few minutes, when his face became extremely red, and his eyes injected with blood. He was quiet at the first incision, but then started up, and was restrained only by great force during the remainder of the operation. He now seemed very much excited, shook his fists, stamped his feet, and manifested a desire to attack some of the persons who surrounded him : at the same time he was quite good humored, and disclaimed any intention to do harm. These symptoms soon passed off, without any ulterior bad effects. More excitement was shown in this case than in any I have witnessed ; and this perhaps might have been spared, if the inhalation could have been continued longer, which was prevented by the operation being about the mouth, and the consequent necessity of removing the tube.

CASE XVII.—On March 11th, I exhibited ether to a delicate French lady, who required the removal of two encysted tumors, one on the lower, the other on the upper eyelid. At the time fixed for the operation I found her quite pale, and somewhat feeble from the effects of two or three days illness, and a dose of opium she had taken the night previous. I was therefore averse to have her inhale much ether. After respiring it for a few minutes, the pulse seemed to be rapidly diminishing, and I proceeded to remove one of the tumors. She shortly manifested signs of great excitement, and made a most active resistance.

A second dose being given, she very soon became entirely insensible, and I began to remove the tumor in the upper lid. The first incisions were quite unheeded, but she soon displayed great irritability and resistance, as in the former inhalation. After the operation she remained for some time nervous, dizzy, and was occasionally a little faint—an effect I had anticipated.

CASE XVIII.—On March 14th, I assisted at the Hospital in an operation performed by Dr. Hayward for a vesico-vaginal fistula. The patient resisting the inhalation from the ordinary apparatus, I had a sponge moistened with ether placed at her mouth. She breathed through this for five

minutes without the least complaint, and then became insensible. The inhalation was continued for a few minutes longer, until the respiration became stertorous, when the application was desisted from.

During the operation on the fistula, which was situated at the fundus of the bladder, and required to be forcibly brought down to the external organs in order to expose it to view, the performance of which is ordinarily attended with excessive pain, not the slightest complaint was made. A portion of the edges of the fistula was removed, and the sutures inserted; the whole operation occupied about twenty minutes, the patient remaining tranquil throughout the entire period.

CASE XIX.—On Saturday, March 6th, Dr. J. C. Warren applied the actual cautery at the Hospital to a patient with a paralytic affection of the lower extremities arising from a caries of the dorsal vertebræ. Previous to the application his pulse was 120, increased perhaps by the excitement of being brought up stairs into the amphitheatre. He inhaled ether with difficulty, so that about ten minutes were required to render him insensible. Dr. Warren then applied successively three irons heated nearly to a white heat, slowly over the back, scoring it, as it were, in different directions. As the flesh smoked, and the hot iron hissed on the surface, the spectators could not but be struck with admiration at the entire immunity from pain, and perfect stillness of the patient, while subjected to this apparently most painful and appalling resort of surgery.

On his return to consciousness he was quite ignorant that the operation had been done, said he had been in a delightful dream, and that his sensations were more agreeable than they had been for a year.

RESULTS.

We need not dwell upon the mode in which ether produces the peculiar effects recorded, whether immediately through the nerves of the mucous membrane, or by being imbibed into the pulmonary blood. Dr. Charles T. Jackson informs me, that in order for the inhalation to produce the full and desired effect, rectified sulphuric ether in its purest state should be used, entirely free from alcohol. It thus becomes much less irritating during the inhalation, with more decided effects at the time, and none of those subsequent unpleasant symptoms, which would occur from ether in its ordinary state.

The following conclusions present themselves, which admit of being arranged under three distinct heads.

A. *As to Age and Temperament.*—1st. Young children and females seem most easily to be brought under its influence.

2nd. Females of nervous temperament are not unfrequently brought to a condition closely resembling hysteria.

3rd. Men of powerful muscular frames sometimes become violently frantic at first, requiring the exertions of several persons to restrain them. This state is succeeded by one of semi-consciousness, but also of insensibility to pain.

B. *As to the Method to be employed.*—1st. The use of the ordinary inhaling apparatus seemed in many cases to occasion at first irritation and choking.

2nd. This irritation either does not exist, or in a less degree, in cases where *cloth* or *sponge* has been used, which has been pretty extensively employed at the Hospital and in private practice by Dr. J. C. Warren and myself.

3rd. In many cases it is impossible, in consequence of the tender age of the patient, or his refractory nature, to make him comprehend the use of the ordinary apparatus, and here the cloth or sponge will be found of great service.

4th. A quieting effect is produced even when ether is sprinkled upon the bed clothes, or a sponge moistened with it is laid upon the pillow ; thus sometimes superseding the use of an opiate.

C. *As to its Influence and Effect.*—1st. When the effect is perfect, the patient having recovered, generally expresses himself as previously under the influence of a pleasant dream, notwithstanding the severity of the operation.

2nd. A partial effect is often produced, in which the patient is entirely free from pain, but yet conscious of the different steps of the operation. Uneasiness, apparently the result of suffering, is in these instances generally referred to a disagreeable dream, or to some cause not immediately connected with the operation.

3rd. In some cases asphyxia is produced, requiring the admission of fresh air, with the use of frictions, to the patient, and in the most severe cases the internal administration of stimulants.

4th. Repetition increases the susceptibility, so far as observed.

5th. No limit of time can as yet be assigned at which its use becomes unsafe. In one instance here recorded, the patient was kept under its influence for a half, and in another for three quarters, of an hour.

6th. The effect is generally evanescent, and the patient being spared the shock of severe pain upon his system, seems to recover more rapidly than in ordinary cases. Out of more than fifty instances which have fallen under my observation, I am not aware of a single one in which its use has proved permanently deleterious.

7th. Various observations show, that when the patient is to undergo a severe operation under the influence of the ether, its application should be employed repeatedly before the day of the operation, as well to instruct him how to respire it thoroughly, as to ascertain the peculiar manner in which it affects him.

HISTORY.

Having been conversant with the principal facts relating to the introduction of the inhalation of ether into surgical operations, it may not be considered inappropriate to connect, with the above cases, a slight sketch of its early history, so far as I am acquainted with it.

In the early part of October, 1846, Dr. W. T. G. Morton called at the house of Dr. J. C. Warren, and stated to him that he was in possession of a means for preventing pain in surgical operations, and that he should be glad to have the application made by Dr. W. in a surgical case. Having made some inquiry as to its safety and mode of exhibition, this gentleman agreed to afford him the earliest opportunity for employing it.

A few days after, on October 13th, a patient at the Massachusetts General Hospital, having to undergo an operation for removal of a tumor of the neck, was brought into the operating theatre, all the arrangements made for the operation, and Dr. Warren was about to begin, when he arrested his hand, saying,—“I now recollect, that I promised Dr. Morton to give him the earliest opportunity of trying a mode for preventing pain in surgical operations, and if the patient consents I shall defer this operation to another day, and invite Dr. M. to administer his application.” The patient consenting, the operation was accordingly postponed to the following Friday, October 16th, and Dr. W. having requested the House-Surgeon to invite the attendance of Dr. Morton, that gentleman was present and made the first public application of the inhalation of ether.

On the following day, a patient requiring the removal of a tumor from the arm, and being rendered insensible by Dr. Morton's application, Dr. Warren requested Dr. Hayward, who was present, to perform the operation.

A few days subsequent to this, Dr. Warren met Dr. Charles T. Jackson, who informed him that he had suggested the use of the ether to Dr. Morton.

On Nov. 6th, Dr. Morton addressed a letter to Dr. Warren, to be communicated to the Surgeons of the Hospital, in which he professed himself ready to disclose the composition of this agent to them, and also to permit as liberal a use of it as was reasonable under existing circumstances.

On the following day it was exhibited to a young woman, who was to submit to an amputation of the leg by Dr. Hayward ; being the first amputation performed under the use of ether. At the same time Dr. Warren operated on a female for the removal of a portion of the lower jaw. In both these cases the inhalation was quite successful, but most perfectly in the amputation.

On November 9th, Dr. H. J. Bigelow read a paper on this subject to the Boston Society for Medical Improvement, an abstract of which he had previously read before the Academy of Sciences.

On December 3d, Dr. Warren communicated to the Boston Medical and Surgical Journal an account of the first surgical operations under the ethereal inhalation.

The preceding operations at the Hospital by Drs. Warren and Hayward, were followed by a variety performed by the other Surgeons of that institution, Drs. Townsend, Parkman, H. J. Bigelow and myself. Among them may be mentioned the reduction of two dislocations of the humerus by Dr. Parkman, one of which was easily managed without having recourse to the ordinary powerful apparatus.

To these in the Hospital, succeeded operations in private practice by myself, the above-mentioned gentlemen, Dr. Peirson of Salem, and at length in various parts of the country.

In Europe it has been received with the greatest enthusiasm. Amputations of the limbs and breasts, the removal of stone in the bladder, and the Cæsarean section, have been performed, all with immunity from pain ; it has even been given to mitigate the sufferings of labor without arresting the contractions of the uterus.

The most striking part of the history of this valuable remedy remains to be mentioned, which is, that notwithstanding the general and almost indiscriminate use of a means apparently so powerful in its nature, not a single case has thus far been recorded, in which it has produced fatal consequences. It is to be hoped, therefore, that by a better experience in its use—an experience we shall soon be able to obtain from the examples

constantly afforded—it may be rendered as safe as any other article of the materia medica.

As was to have been expected, various claimants have arisen for the honor of the discovery, and one or two persons in France have certainly approximated very closely to it, without having carried their investigations, however, to a sufficient length to render any practical benefit to humanity. A consent almost unanimous, both in England and France, has conceded this honor to our fellow townsmen, Dr. W. T. G. Morton and Dr. Charles T. Jackson.

Boston, March, 1847.

